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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/627,303

07/24/2003

Satyadev R. Patel

P109-US

1907

7590

08/11/2004

Gregory R. Muir
350 Potrero Avenue
Sunnyvale, CA 94085

EXAMINER

THOMAS, BRANDI N

ART UNIT

PAPER NUMBER

2873

DATE MAILED: 08/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,303

Applicant(s)

PATEL ET AL.

Examiner

Brandi N Thomas

Art Unit

2873

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 128-187 is/are pending in the application.
- 4a) Of the above claim(s) 128-147 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 148-187 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/26/04 5/26/04.
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. 7/29/04.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: Election/Restriction.

DETAILED ACTION

Examiner's Comment

Examiner acknowledges applicant's request to cancel claims 1-127 and the addition of new claims 128-187.

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 128-147, drawn to a method of forming a spatial light modulator, classified in class 359, subclass 290.
 - II. Claims 148-187, drawn to a spatial light modulator, classified in class 359, subclass 291.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by a materially different process such as fabricating a MEMS device.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

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4. During a telephone conversation with Gregory Muir on 7/29/04 a provisional election was made with traverse to prosecute the invention of II, claims 148-187. Affirmation of this election must be made by applicant in replying to this Office action. Claims 128-147 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

6. Acknowledgement is made of receipt of Information Disclosure Statement(s) (PTO-1449) filed 4/26/04, 5/26/04, and 6/18/04. An initialed copy is attached to this Office Action.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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8. Claims 148, 153-159, 164-166, 168-173, 187 are rejected under 35 U.S.C. 102(e) as being anticipated by Patel et al. (2004/0008402 A1).

Regarding claim 148, Patel et al. discloses, in figures 3a and 3b, a spatial light modulator, comprising: an array of movable mirror plates (230), each mirror plate (230) being attached to a hinge (214) that is supported by a hinge structure (210) such that the mirror plate (230) can rotate relative to a substrate (120), on which the hinge structure (210) is formed (section 0040); and wherein the hinge (214) and the mirror plate (230) is spaced apart from 0.15 to 0.45 micrometers (section 0056).

Regarding claim 153, Patel et al. discloses, in figure 3b, a spatial light modulator wherein the array of mirror plates (230) comprises at least 1280 mirror plates along a length of the mirror plate array (section 0045 and 0047).

Regarding claim 154, Patel et al. discloses, in figure 3b, a spatial light modulator wherein the array of mirror plates (230) comprises at least 1400 mirror plates along a length of the mirror plate array (section 0045 and 0047).

Regarding claim 155, Patel et al. discloses, in figure 3b, a spatial light modulator wherein the array of mirror plates (230) comprises at least 1600 mirror plates along a length of the mirror plate array (section 0045 and 0047).

Regarding claim 156, Patel et al. discloses, in figure 3b, a spatial light modulator wherein the array of mirror plates (230) comprises at least 1920 mirror plates along a length of the mirror plate array (section 0045 and 0047).

Regarding claim 157, Patel et al. discloses a spatial light modulator wherein the hinge (214) and the mirror plate (230) is space apart from 0.15 to 0.25 micrometers (section 0056).

Regarding claim 158, Patel et al. discloses a spatial light modulator wherein the hinge (214) and the mirror plate (230) is space apart from 0.25 to 0.35 micrometers (section 0056).

Regarding claim 159, Patel et al. discloses a spatial light modulator wherein the hinge (214) and the mirror plate (230) is space apart from 0.35 to 0.45 micrometers (section 0056).

Regarding claim 164, Patel et al. discloses, in figures 1a and 3a, a spatial light modulator further comprising: an electrode (126) proximate to each mirror plate for electrostatically deflecting the mirror plate (230).

Regarding claim 165, Patel et al. discloses, in figure 8a, a spatial light modulator wherein the substrate (120) is glass or quartz that is visible light transmissive (section 0052).

Regarding claim 166, Patel et al. discloses a spatial light modulator wherein the substrate (120) comprises an anti-reflection film on a surface of the substrate (120) (section 0053).

Regarding claim 168, Patel et al. discloses, in figures 3b and 4b, a spatial light modulator wherein each mirror plate (230) has an area; and wherein a ratio of a summation of all areas of the mirror plates to an area of the substrate is 90 percent or more.

Regarding claim 169, Patel et al. discloses a spatial light modulator wherein each mirror plate (230) rotates relative to the substrate (120) in response to an electrostatic field (section 0039).

Regarding claim 170, Patel et al. discloses a spatial light modulator, further comprising: a first electrode that drives the mirror plate rotate in a first rotation direction (ON State) relative to the substrate; and a second electrode that drives the mirror plate rotate in a second rotation direction (OFF State) relative to the substrate (section 0039).

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Regarding claim 171, Patel et al. discloses a spatial light modulator wherein the first electrode and the second electrode are on the same side relative to the rotation axis of the mirror plate (section 0039).

Regarding claim 172, Patel et al. discloses a spatial light modulator wherein the first electrode and the second electrode are on the opposite side relative to the rotation axis of the mirror plate (section 0039).

Regarding claim 173, Patel et al. discloses a spatial light modulator wherein the substrate is semiconductor (section 0039).

Regarding claim 187, Patel et al. discloses a projection system (100), comprising: a light source (102); a spatial light modulator (110) (section 0035) that further comprises: an array of mirror devices formed on a substrate (120) for selectively reflecting light incident on the mirror devices (230), wherein each mirror device comprises: a mirror plate (230) for reflecting light; a hinge (214) attached to the mirror plate (230) such the mirror plate (230) can rotate relative to a substrate (120) (section 0040), wherein the hinge (214) and the mirror plate (230) is spaced apart from 0.15 to 0.45 micrometers (section 0056); and a hinge support (210) on the substrate (120) for holding the hinge (214) on the substrate (120) (section 0040); a condensing lens (106) for directing light from the light source (102) onto the spatial light modulator (110); and a projecting (108) for collecting and directing light reflected from the spatial light modulator (110) on to a display target (112).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 149-152, 160-163, and 174-186 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (2004/0008402 A1).

Regarding claims 149 and 160-162, Patel et al. discloses a spatial light modulator with an array of mirror plates except for the adjacent mirror plates of the array have a center-to-center distance from 4.38 to 10.16 micrometers, 6.23 to 9.34 micrometers, 4.38 to 6.57 micrometers, and 4.38 to 9.34 micrometers. It would have been obvious to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers, 6.23 to 9.34 micrometers, 4.38 to 6.57 micrometers, and 4.38 to 9.34 micrometers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers, 6.23 to 9.34 micrometers, 4.38 to 6.57 micrometers, and 4.38 to 9.34 micrometers for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claims 150-152, Patel et al. discloses a spatial light modulator with an array of mirror plates when the adjacent mirror plates are parallel to the substrate (section 0040) except for the adjacent mirror plates have a gap from 0.15 to 0.25 micrometers, a gap from 0.25 to 0.45

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micrometers, and a gap from 0.45 micrometers or less. It would have been obvious to modify the spatial light modulator to include a gap from 0.15 to 0.25 micrometers, a gap from 0.25 to 0.45 micrometers, and a gap from 0.45 micrometers or less, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a gap from 0.15 to 0.25 micrometers, a gap from 0.25 to 0.45 micrometers, and a gap from 0.45 micrometers or less for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claim 163, Patel et al. discloses, in figures 3a and 3b, a spatial light modulator, wherein the hinge (214) is attached to the mirror plate (230) such that the mirror plate (230) can rotate relative to a substrate (120) along a rotation axis that is parallel to but offset from a diagonal of the mirror plate (230) when viewed from the top of the mirror plate (230) (section 0040); wherein the mirror plate (230) can rotate to an angle at least 14 degrees relative to the substrate (120) (section 0040); and wherein the hinge (214) and the mirror plate (230) is spaced apart from 0.15 to 0.45 micrometers (section 0056) except for the adjacent mirror plates of the array have a center-to-center distance from 4.38 to 10.16 micrometers. It would have been obvious to modify the spatial light modulator to include a center-to-center distance from 4.38 to 10.16 micrometers, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (*In re Aller*, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include a

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center-to-center distance from 4.38 to 10.16 micrometers for the purpose of the capability of selectively reflecting a light beam incident onto the mirror plates.

Regarding claim 174-186, Patel et al. discloses, in figure 3b and 4b, a spatial light modulator wherein the mirror plate (230) is attached to the hinge (214) such that the mirror plate (230) rotates in a first and second direction relative to the substrate (sections 0039 and 0040) except for the mirror plates rotating in a first direction to an angle from 15 degrees to 27 degrees, 17.5 degrees to 22.5 degrees, around 20 degrees, and around 30 degrees and the mirror plates rotating in a second direction to an angle from 2 degrees to 9 degrees. It would have been obvious to modify the spatial light modulator to include the mirror plates rotating in a first direction to an angle from 15 degrees to 27 degrees, 17.5 degrees to 22.5 degrees, around 20 degrees, and around 30 degrees and the mirror plates rotating in a second direction to an angle from 2 degrees to 9 degrees, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (In re Aller, 105 USPQ 233). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the spatial light modulator to include the mirror plates rotating in a first direction to an angle from 15 degrees to 27 degrees, 17.5 degrees to 22.5 degrees, around 20 degrees, and around 30 degrees and the mirror plates rotating in a second direction to an angle from 2 degrees to 9 degrees for the purpose of angling the mirror plates to produce a quality image.

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11. Claim 167 is rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (2004/0008402 A1) as applied to claim 165 above, and further in view of Huibers (2004/0012838 A1).

Patel et al. teaches a spatial light modulator including a substrate except that it does not show a light absorption frame around the substrate. Huibers shows that it is known to provide a light absorption frame for absorbing many wavelengths in the visible spectrum (section 0085). Therefore it would have been obvious to someone of ordinary skill in the art at the time the invention was made to combine the device of Patel et al. with the a light absorption frame of Huibers for the purpose of absorbing many wavelengths in the visible spectrum (section 0085).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Pan (2004/0004753 A1) discloses a micro-mirror array fabricated on one substrate is bonded to a second substrate that includes addressing electrodes and control circuitry.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brandi N Thomas whose telephone number is 571-272-2341. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on 571-272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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August 5, 2004


RICKY MACK
PRIMARY EXAMINER